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EVALUATION OF A SAWFLY INFESTATION IN THE LEWIS AND CLARK NATIONAL FOREST, MONTANA IN JUNE 1960

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Prepared by the
Forest Insect Laboratory
Missoula, Montana

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HISTORY

For the past several years, overstory lodgepole and numerous ponderosa pine trees have been severely defoliated by one or more species of sawflies within the Little Rockies section of the Lewis and Clark National Forest, Montana. The infestation covered a total of about 6,000 acres during 1959 (fig. 1). The infestation was reported on August 6, 1959 by M. F. Phillip of the supervisor's staff of the Forest when he sent specimens of fully grown sawfly larvae for identification by the Laboratory. These fitted the description of the lodgepole sawfly, Neodiprion burkei Midd.

Dr. Harold R. Dodge of the Laboratory investigated the defoliated areas September 25, 1959 and found that female sawflies had already deposited eggs in the current year's needles. This indicated that the pest overwintered in the egg stage. An adult sawfly collected during the above investigation was identified by B. D. Burks as N. fulviceps complex. Because of conflicting information about the life-cycle of this species and N. burkei--Burke has claimed that burkei does not overwinter in the egg stage[1]--it seemed preferable at that time to consider the sawfly involved as simply Neodiprion fulviceps complex.

1/ Burke, H. E. 1932. Two destructive defoliators of lodgepole pine in the Yellowstone National Park. U.S. Dept. Agric. Circ. 224. 20 pp., illus.

EVALUATION

Personnel from the Laboratory visited the area on June 23, 1960 to evaluate the significance of the infestation. The best indicator of current "hot spots" proved to be overstory pines supporting only 1960 foliage. The insect seemed to prefer old needles on the largest pines, but, when it had destroyed all this choice foliage, it moved into the understory--trees 6 to 10 feet high.

Several stages of sawfly development were collected or observed within "hot spots" visited. The insect was still mostly in the egg stage. Three larval stadia were feeding on the few remaining 1959 needles. Some larvae had black heads, some brown. One empty cocoon was found on a twig and two others picked from ground litter. No cocoons were found by sifting the duff under infested trees.

Larvae brought back to the Laboratory spun cocoons in early August and emerged September 17-30. Reared adults were sent on October 5 to Dr. H. H. Ross, Illinois Natural History Survey, Urbana, for identification. Dr. Ross determined that two species of sawflies were involved. One species appeared to be Neodiprion nanulus contortae, which has black-headed larvae, and the other is closely related to N. fulviceps complex which has larvae with brown heads in early instars. Near the last instar, the heads change to yellow and two short stripes of darker color appear on the vertex of the heads. Identification by Ross substantiates that by Burks in 1959, so it now seems certain that N. burkei is not involved in the infestation.

Some larger trees have died and others are partly dead in several areas, presumably because of repeated defoliation (figs. 206). The infestation decreased in severity during 1959 to a moderate status in 1960. The infestation trend thus seems to be on the decrease, because infested trees were fewer in number, about 68 percent of the eggs were nonviable, and a followup investigation on July 14 revealed no larvae or cocoons.

DISCUSSION

Sawfly epidemics are usually complex. The one in the Little Rockies appears to be no exception. The presence of two species of sawflies attacking lodgepole and ponderosa pine trees simultaneously creates obvious problems when considering possible control action. Slight differences in the life-cycle of each of the sawflies probably exist and then habits may vary according to host species. Therefore, before any chemical control treatments can be applied the following factors should be studied: (1) What are the life-cycles of both species? (2) Will the infestation trend increase? (3) Will the population decline due to natural enemies and disease similar to past sawfly epidemics?

A single chemical spray application, aimed at the current larval population in June, obviously could not be expected to give complete control of the infestation. By late June eggs in the needles are still hatching and several larval stadia are feeding. A spray lethal to larvae may not kill eggs, so reinfestation could occur from continued egg hatch. An ideal time to spray would be when all larvae have emerged but before any have reached the instar preparatory to pupation. This vulnerable period may be hard to determine.

Tree mortality from past sawfly outbreaks in this region generally has been very low. However, poor, rocky soil and a normally low precipitation level in the Little Rockies area, might result in greater tree mortality if the present infestation continues at a high level for several more years.

A tentative life-cycle is offered here for at least one species of sawfly currently present in the Little Rockies. It overwinters as eggs in the needles of the current year, with the hatch occurring during June and July. Larvae feed on needles of the previous year until the end of August then pupate in the litter. Some pupae may hold over in the duff till next spring, but most adults emerge in September and the females lay eggs in the needles of the current year.

The Laboratory will evaluate the infestation during June 1961. If it is found to be continuing unabated, there may be opportunities to make further observations of the life histories, habits, and natural control factors that may affect the sawfly populations.

SUMMARY

Two species of sawflies of the genus Neodiprion have defoliated overstory lodgepole and ponderosa pine trees for the past several years on a total of about 6,000 acres within the Little Rockies section of the Lewis and Clark National Forest, Montana. A biological evaluation of the infestation during June 1960 revealed that the infestation decreased from a highly epidemic status in 1959 to one of moderate intensity in 1960. An examination made on June 23, 1960 revealed sawfly eggs within, and three larval stadia feeding externally on, the 1959 needles of the host trees. Because several development stages of the two sawfly species are present at once, one chemical spray application cannot give effective control of the present outbreak. Sawfly epidemics usually decline after three or four years due to natural enemies and disease. Further study is needed on the life-cycles, natural control factors, and identification of the sawfly species present.

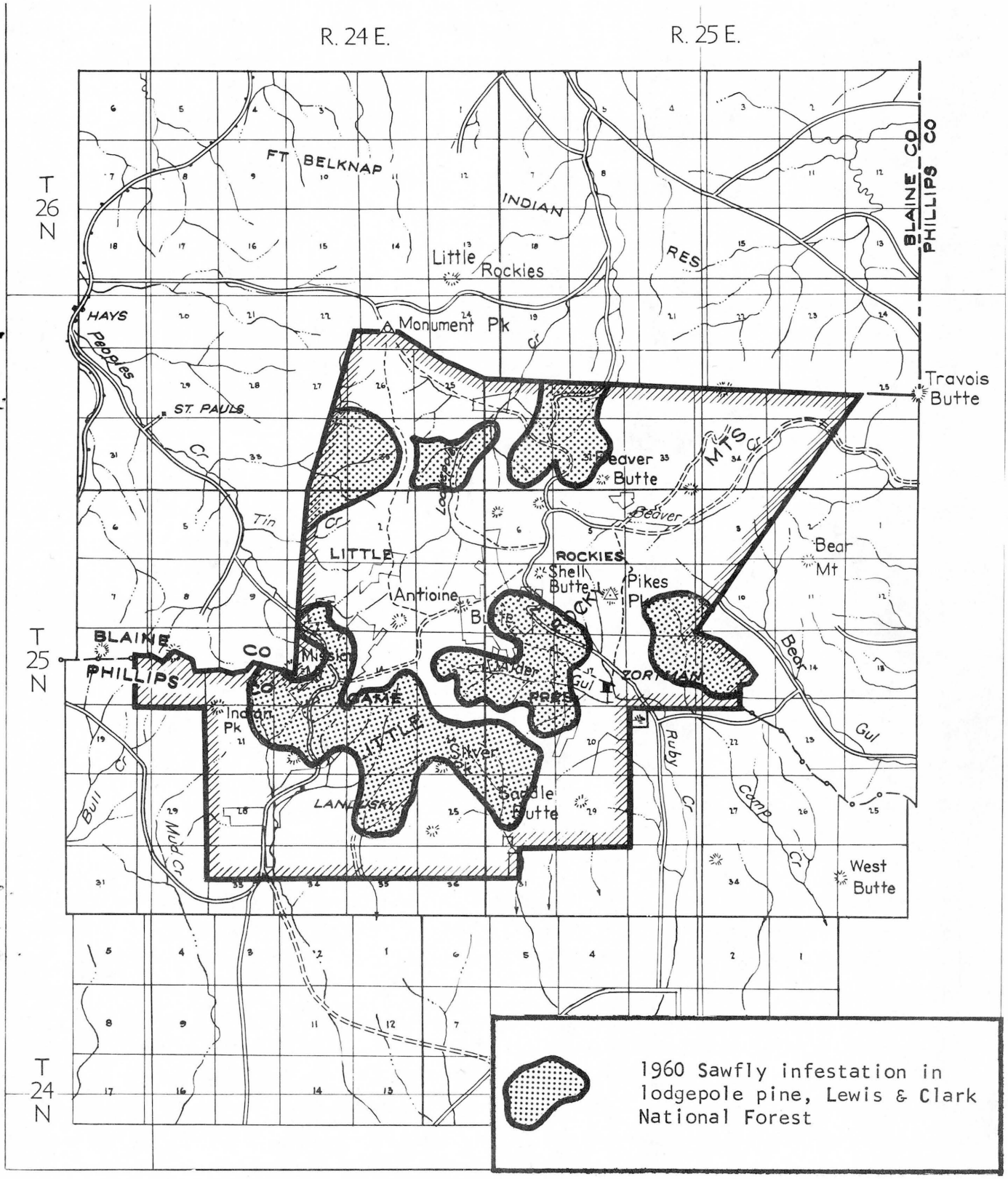

Figure 1.--Sawfly infested areas of lodgepole pine in the Little Rocky Mountains, Lewis and Clark National Forest, Montana.

Figure 2.--Group of mature lodgepole pine trees attacked by sawflies in 1959. Of 36 trees in the group, 12 were dead when photographed July 14, 1960, and the surviving trees showed the effects of very heavy defoliation in 1959 and some light defoliation in 1960. Lodgepole Creek-Beaver Creek divide near Zortman, Lewis and Clark National Forest, Montana. FIL #1854.

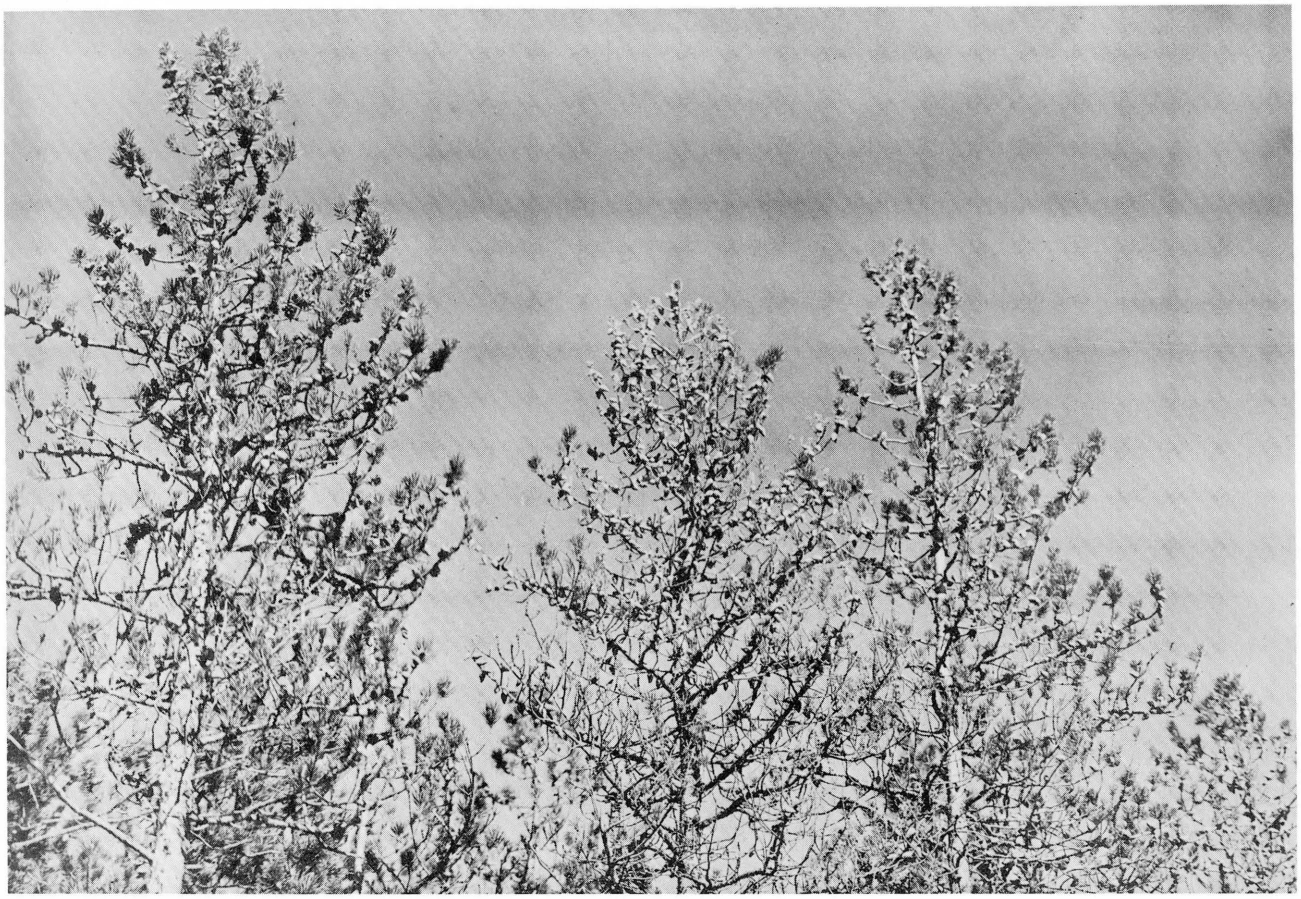

Figure 3.--Tops of mature lodgepole pine trees heavily defoliated by sawflies in 1959, showing abnormally heavy cone production in 1960. Mission Mountain, Lewis and Clark National Forest, Montana. FIL #1852.

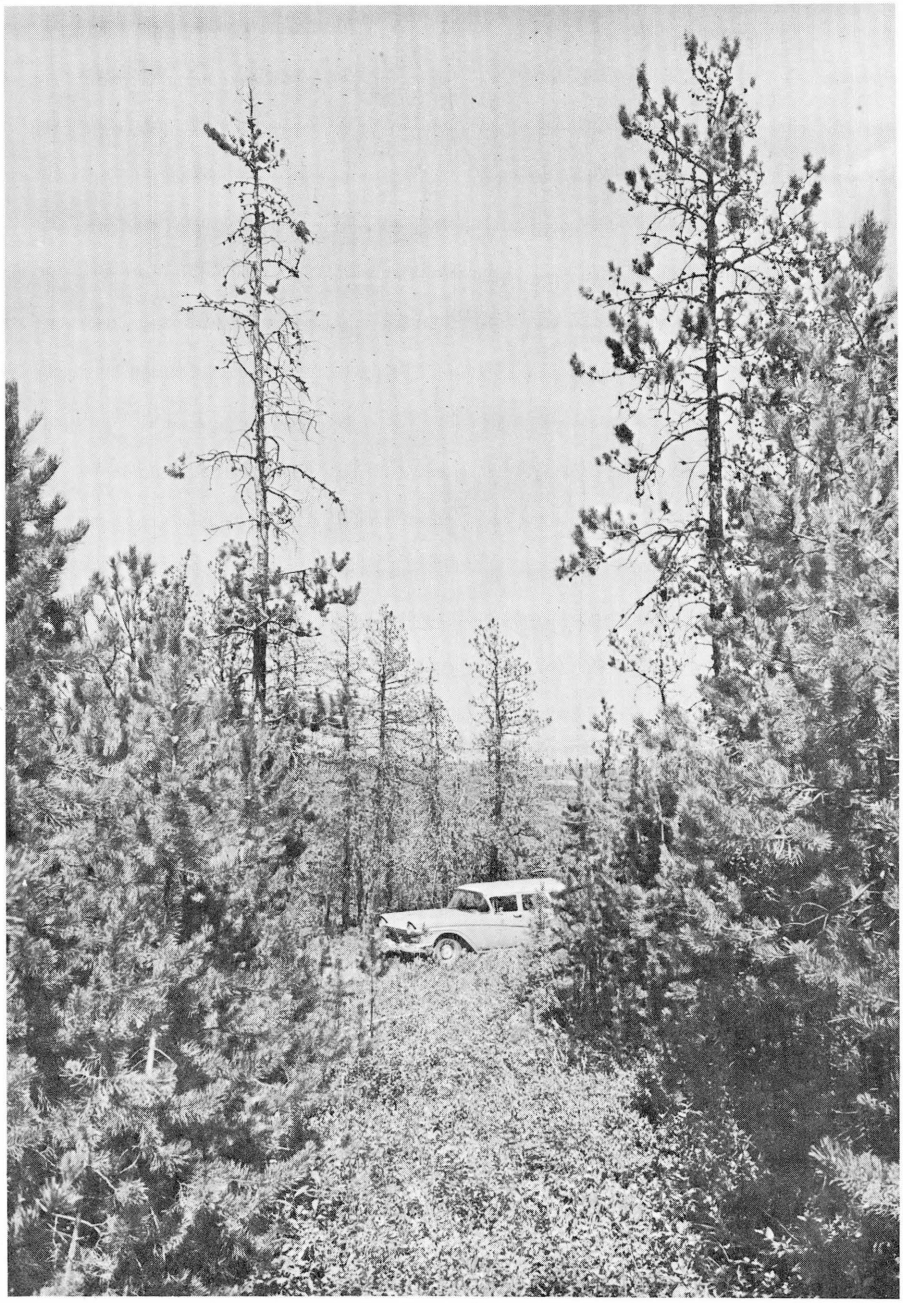

Figure 4.--A characteristic of the sawfly infestation on the Lewis and Clark National Forest (Montana) in 1959 was the severe defoliation from larval feeding in the mature overstory trees and the relative absence of infestation in the understory reproduction. View of typical lodgepole pine forest on the Lodgepole Creek-Beaver Creek divide. FIL #1855.

Figure 5.--Comparison of lodgepole pine twig heavily defoliated by sawfly larvae in 1959 (only 1960 needles remain) and twig bearing normal needle complement. Zortman Mountain. FIL #1856.

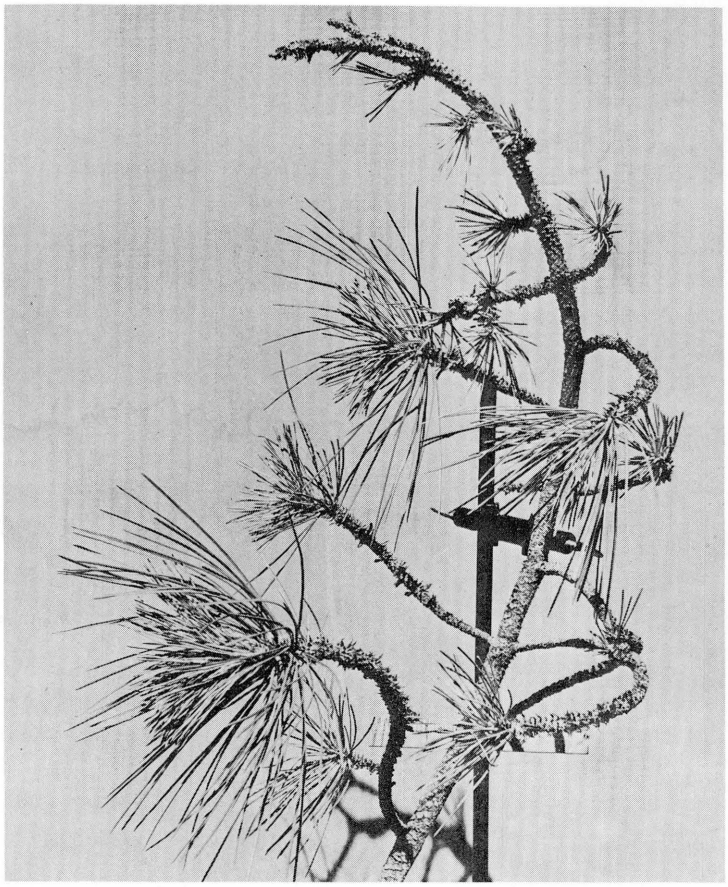

Figure 6.--Ponderosa pine twig heavily defoliated by sawfly larvae. Note shortened 1960 needles, few remaining 1959 needles, and absence of older needles. Although sawfly infestation was primarily on lodgepole pine trees, intermingled ponderosa pine trees were also fed upon. Zortman, Montana. FIL #1857.